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CCS Tool Training

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CCS Tool Overview

This is a collection of purpose built tools for crimping, cutting, and sealing pressurized tube systems for the purpose of stabilizing systems for emergency response mitigation missions.

Three tool systems allowing for positive action on various deployed systems:

1. Nicopress (Commercial, off the shelf [COTS])
2. Lawrence Livermore National Laboratory Tool (custom built)
3. Los Alamos National Laboratory Tool (custom built)

Each tool has a specific application, determined by the system, tubing to be crimped, cut, or sealed, and the available space to apply the tool.

➤ Instructions for use of the specialized tools are included in the LANL and LLNL Tool Kits.



CCS Tool Kits: Nicopress



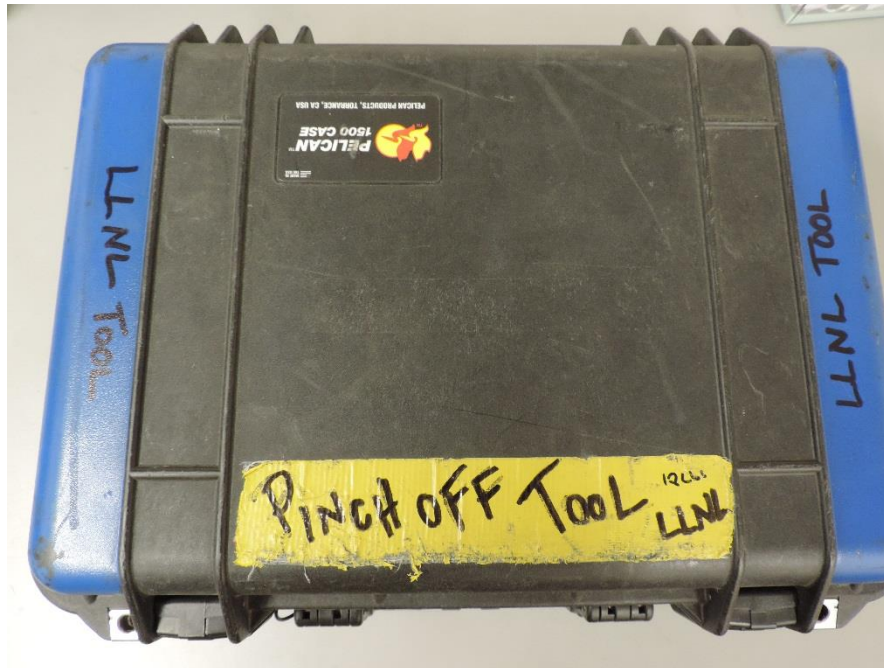
Nicopress tool kit: deployed to EOD teams, also deployed with ARG on the ARG main body loadout, KitBin #9

CCS Tool Kits: LANL Tool

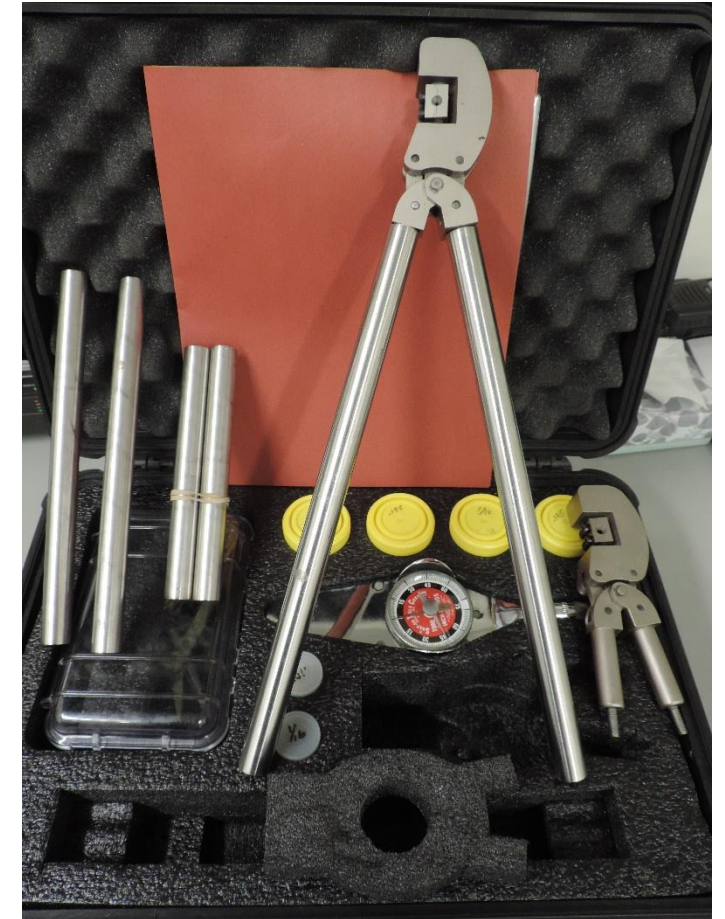


LANL tool kit: specific to ARG, deployed with main body on KitBin #9

CCS Tool Kits: LLNL Tool



LLNL tool kit: specific to ARG, deployed with main body on KitBin #9





Specific Tools

Nicopress:

COTS – available from numerous hardware, marine, and other stores

On the loadout the kit contains the press, attachable handles which act as “cheater bars”, and other accessory tools.

Allows for application of pressure to a small area to crimp-seal tubing.

One size only working surface.





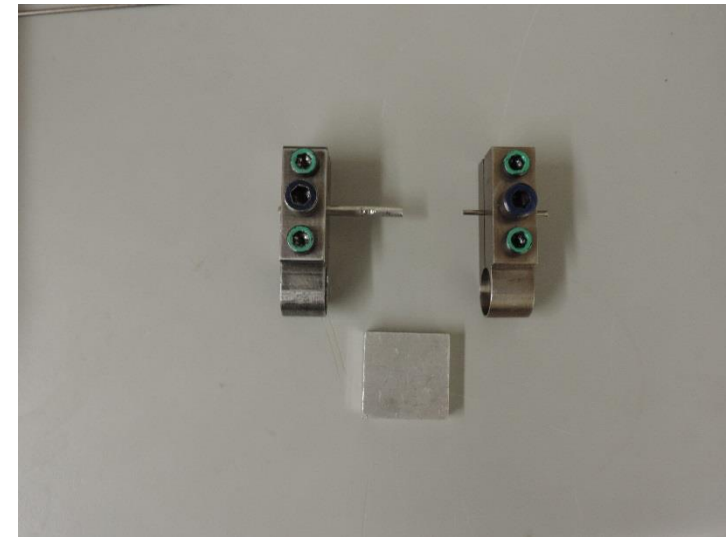
Specific Tools

LANL Tool:

Custom designed and built by engineers at LANL, with LANL systems in mind.

On the loadout this kit is in an orange pelican-style hard sided case and contains all parts and accessories to deploy the tool.

Two different sized tools for two common types of tubing used in systems. Small profile for small application spaces.



Specific Tools

LNLL Tool:

Custom designed and built by engineers at LLNL, with LLNL systems in mind.

On the loadout this kit is in a black pelican-style hard sided case and contains all parts and accessories to deploy the tool.

Two different sized tool heads for two common types of tubing used in systems.

Two sets of interchangeable handles of different lengths.

This tool is orientation specific.





Purpose of CCS Tools

Take home: These tools are not intended to stop the flow of gasses or air through tubing. The purpose of using these tools is to reduce/restrict the flow of gasses/air through tubing.

- They function by applying large amount of force to a small surface area, effectively applying a “cold-weld”.
- The critical purpose of these tools is to limit the amount of air (oxygen) getting back into the system. The crimp seal will reduce the amount of outflow from the system, but not stop it (the internal pressures are too great).
- Main goal is to prevent (or at least reduce the likelihood) of oxidation occurring.
- **The LNLL tool is orientation specific!** The “cone” of the tool head must face the side of the system to be sealed.
- Nicopress and LANL tool are not orientation specific.
- Instructions for which side of the system is to be sealed will be determined during planning and will be communicated by the DOE SMEs.

Basics - LANL Tool Instructions



NOTE: These instructions are derived from those carried and supplied by DOE ARG personnel. The LANL tool has two sets of instructions; one set for **XXX-3,4, and 7**, the other for everything else.

- 1) Ensure you have a detailed briefing from SMEs regarding mitigation steps to be taken, to include which side of the system is to be sealed off, and which side is to be cut (as applicable).
- 2) Inspect the tool kit to make sure you have everything – don't go down range without a critical piece of kit. The LANL kit should contain:
 - a) Crimp tools (also called pinch-off tools) for 1/8 and 1/16 inch tubing.
 - b) A calibrated torque wrench with a range of 0 – 100 (or 150) inch-pounds.
 - c) 3/8 inch internal square drive by 1/4 inch internal square drive adapter.
 - d) 1/4 inch by 14 inch drive extension.
 - e) 2 each ball hex-head drivers, both 1/4 inch drive; 5/32 and 3/16.
 - f) 1" x 1" x 1/4" metal shim.
 - g) Tweezers, scribe, measuring scale, screwdriver, and 1/2" open end wrench.
 - h) 5/32 and 3/16 Allen Wrenches

LANL Tool Instructions



How you should find the LANL Crimp tool:

Tools will be in a zip-lock bag within the larger canvas bag. This canvas bag also contains other accessory tools.

Tools should be assembled as shown, with the threads and underside of the screw heads pre-lubricated (Liqui-Moly NV) for easy operation.

The center pinch pin screw should be tightened snugly (screwdriver).

There should be a short length of tubing of appropriate size in the tool to keep the pinch pin in the withdrawn position.



LANL Tool Instructions



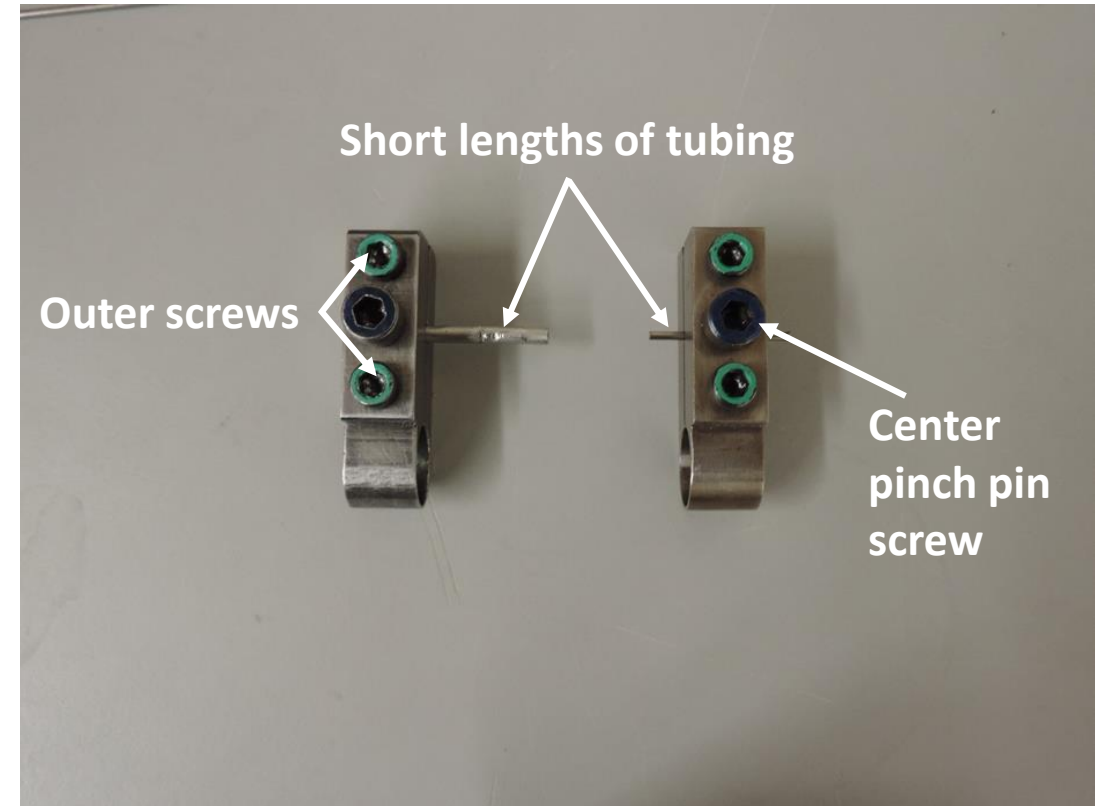
Step #1: Outer two screw on crimp tool (these are captive screws)

- 1) Screw in, and then back the screws all the way out, to make sure the threads are in the captive void.
- 2) Pull lightly on the screws, maybe an additional turn or two, to keep the tip of the screw out of your way for later.

Step #2: Center Screw

- 1) Adjust the screw until the head is at least 1/8" away from the body (back it out at least 1/8") so you can remove the short length of tubing from the tool.

Note: The Liqui-Moly should keep the screw in this position, but the scribe (or similar tool) can be used to pry the pin out of the way as necessary.

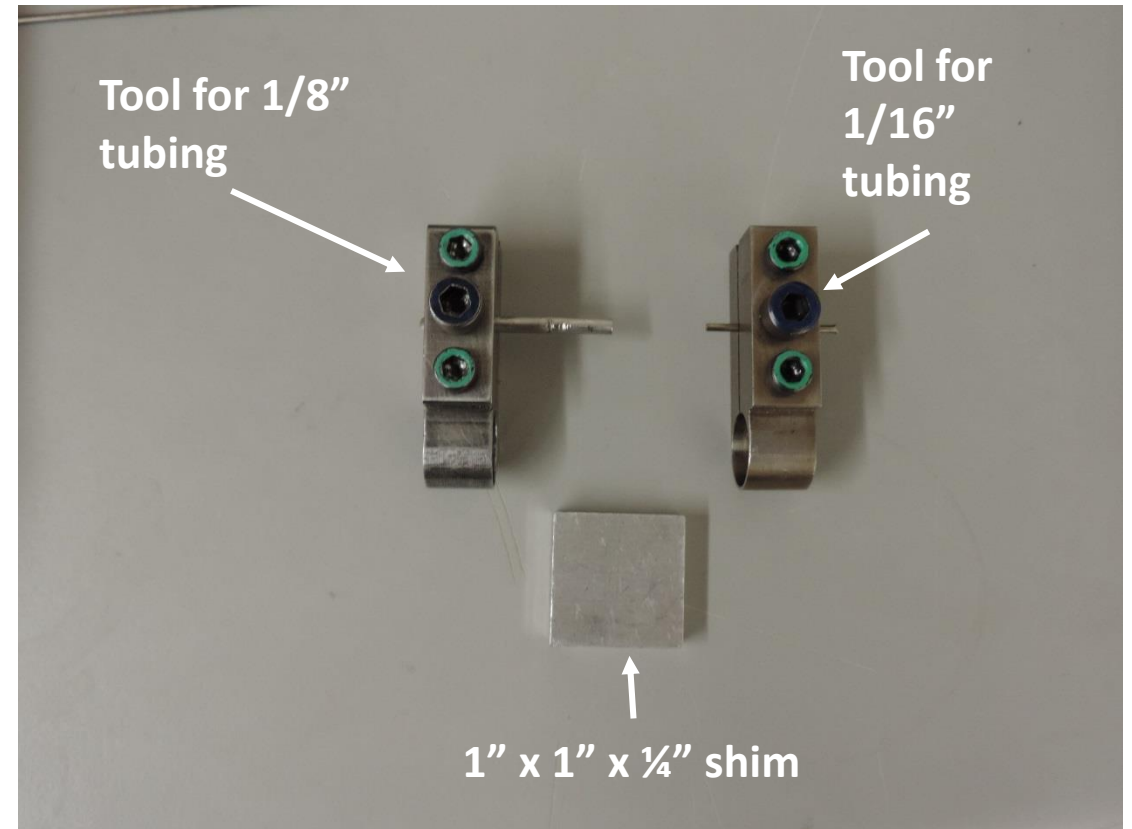


LANL Tool Instructions



Step #3: Installing the tool

- 1) Snap the tool over the tube. This may require a cut out of a **cover, bulkhead, or RV case**, depending on the unit, in order to get your hand through with the tools.
- 2) You will need to restrain the crimp tool while you are tightening the screws.
- 3) Screw in the outer two screws to approximately 20 inch-pounds using the torque tool.
- 4) Screw in the center screw until it is snug, then another 1 ½ turns (or ¾ turn for the 1/16" tubing).



LANL Tool Instructions



- 5) Unscrew the outer two screws until they are captive.
- 6) Screw in the center screw until the head is flush with the body of the tool. You will need to restrain the tool for this.
- 7) Screw in the outer screws finger tight.



LANL Tool Instructions (alternate configurations)

For certain system configurations, this alternate series for Step #3 (from above) will be used instead:

Alternate Step #3:

- 1) Snap the tool over the tube, in contact with the gland nut.
- 2) Place the metal shim (approximately 1" x 1" x ¼") between the tool and the foam of the **adjacent assembly** on the side of the tube towards the center of the system. **Note:** Because of the curvature of the tube and the angle of the tool, the shim may not slide down all the way between the tool and the foam, but the shim will prevent excessive twisting of the tube.
- 3) Screw in the outer two screws to approximately 20 inch-pounds using the torque tool.
- 4) Screw in the center screw until it is snug, then another 1 ½ turns.



LANL Tool Instructions (alternate configurations)

- 5) Unscrew the outer two screws until they are captive.
- 6) Screw in the center screw until the head is flush with the body of the tool. You will need to restrain the tool for this.
- 7) Screw in the outer screws finger tight.
- 8) Outer screws will now be tightened alternately, in 5 inch-pound increments until the torque pressure on each is 60 inch-pounds. (The tool should be closed within a few thousandths of an inch. You may or may not be able to visualize this depending on conditions, which is why the 60 inch-pounds is important.)

LLNL Tool Instructions



How you should find the LLNL Crimp tool:

Components of the tool should be found as shown, with three sets of handles (different lengths), two crimp heads (one for 1/8" and one for 1/16"), an allen wrench set, spare cap screws, torque tool.

Each Die Block should have four cap screws holding them together.

Remember that this tool set is orientation specific.

Step #1:

- 1) Determine the size of tube to be crimped, and the orientation of the crimp as directed by the SMEs.
- 2) Select the appropriate size crimp head and attach the longest handles as practical. Note: keep handles separated at all times, except during use (or calibration).



LLNL Tool Instructions

Step #2:

- 1) Access the tube, and clean if needed. Ensure there is enough tube exposure to perform this operation. Determine exactly where the tube is to be crimped and which end of the tube is to be sealed (info from SMEs).
- 2) Remove the four cap screws holding the die blocks together.
- 3) Position the tube in the inner die block so the cone of the die block faces the side to be sealed.
- 4) Reassemble the die blocks, capturing the tube, then install and tighten the four cap screws to 40 inch-ounces.

Cap screws

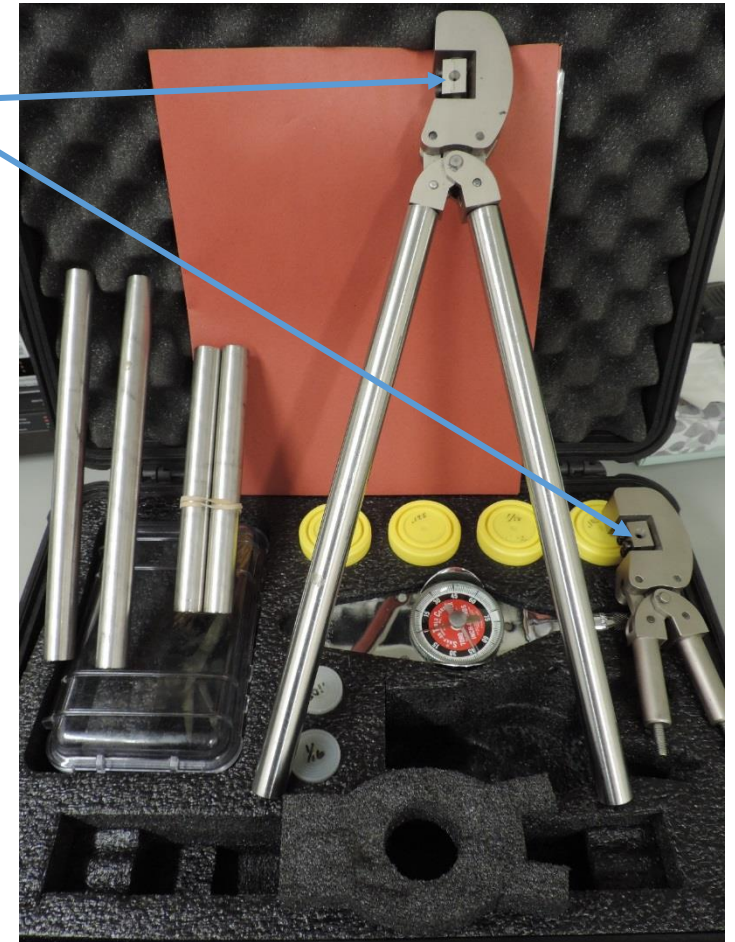


LLNL Tool Instructions

Step #3:

- 1) In one single and continuous motion, squeeze the handles together. Use enough force to deflect the handles (make them move closer together).
- 2) Open the handles and remove the four cap screws.
- 3) Remove the outer die block and carefully remove the tube from the inner die block. **Note:** During this operation DO NOT bend or twist the tube.
- 4) Bend the unsealed tube end (the end from the die opposite the cone shaped opening) back and forth (1 to 3 times) across the welded section until the tubes separate. **Note:** Additional seal may be recommended, such as crimping, welding or capping.

Cone of die block





Summary

- 1) Remember, the purpose of these tools is to reduce or restrict the flow of gas or air into the system. You will most likely not stop the flow OUT of a fully pressurized system. The main goal is to restrict air from getting back into the system.
- 2) Preplanning and good information from the SMEs is crucial. This will tell you the size of tube, help you select the best tool, and tell you how and where the crimp and seal are to be oriented.
- 3) Inspect the tools and familiarize yourselves with the components and how to properly use them.
- 4) Go practice.